5   I claim:

1. A communications method comprising:

providing (i) a first signal having a positive entropy and (ii) a plurality of delayed

versions of the first signal, each delayed version of the plurality of delayed versions

comprising a plurality of available values;

10   encoding data comprising a symbol by representing the symbol as a plurality of

delay values, wherein each of said plurality of delay values comprises an available value

of the plurality of available values for each delayed version of the plurality of delayed

versions; and

transmitting the encoded data across a communications channel.

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2. The communications method according to claim 1, further comprising:

summing the first signal having positive entropy and the plurality of delayed

versions of the first signal, the plurality of delayed versions of the first signal comprising

the plurality of delay values for the symbol.

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3. The communications method according to claim 1, further comprising:

decoding the encoded data by identifying each transmitted, delayed version of the

plurality of delayed versions of the first signal; and

determining a transmitted delay value of the plurality of delay values for each

25   identified delayed version.

5   4. The communications method according to claim 1, wherein the first signal

comprises one of a chaotic signal, a noise signal, and a positive entropy, baseband signal

modulated onto a positive entropy signal having a higher frequency than the baseband

signal.

10   5. The communications method according to claim 1, wherein said decoding step

comprises:

   generating a second signal substantially similar to the first signal,

   summing the second signal and a plurality of reference delays; and

   maximizing a cross-correlation between the encoded data and the sum of the

15 second signal and the plurality of reference delays.

   6. The communications method according to claim 5, further comprising:

   compensating the plurality of reference delays for degradation by the

communications channel of the plurality of delayed versions of the first signal.

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   7. The communications method according to claim 1, wherein said decoding step

comprises:

   generating a weighted third signal substantially similar to the first signal,

   summing the weighted third signal and a plurality of weighted reference delays;

25 and

   performing a least squares fit between the encoded data and the sum of the third

signal and the plurality of weighted reference delays.

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8. The communications method according to claim 7, further comprising:

compensating the plurality of weighted reference delays for degradation by the

communications channel of the plurality of delayed versions of the first signal.

10   9. A communications apparatus comprising:

means for providing (i) a first signal having a positive entropy and (ii) a plurality

of delayed versions of the first signal, each delayed version of the plurality of delayed

versions comprising a plurality of available values;

means for encoding data comprising a symbol by representing the symbol as a

15   plurality of delay values, wherein each of said plurality of delay values comprises an

available value of the plurality of available values for each delayed version of the

plurality of delayed versions; and

means for transmitting the encoded data across a communications channel.

20   10. The communications apparatus according to claim 9, further comprising:

means for summing the first signal having positive entropy and the plurality of

delayed versions of the first signal, the plurality of delayed versions of the first signal

comprising the plurality of delay values for the symbol.

25   11. The communications apparatus according to claim 9, further comprising:

means for decoding the encoded data by identifying each transmitted delayed

version of the plurality of delayed versions of the first signal; and

5   means for determining a transmitted delay value of the plurality of delay values

for each identified, delayed version.

12. The communications apparatus according to claim 9, wherein the first signal

comprises one of a chaotic signal, a noise signal, and a positive entropy, baseband signal

10   modulated onto a positive entropy signal having a higher frequency than the baseband

signal.

13. The communications apparatus according to claim 9, wherein said decoding

means comprises:

15   means for generating a second signal substantially similar to the first signal,

means for summing the second signal and a plurality of reference delays; and

means for maximizing a cross-correlation between the encoded data and the sum

of the second signal and the plurality of reference delays.

20   14. The communications apparatus according to claim 13, further comprising:

means for compensating the plurality of reference delays for degradation by the

communications channel of the plurality of delayed versions of the first signal.

15. The communications apparatus according to claim 9, wherein said decoding

25 means comprises:

means for generating a weighted third signal substantially similar to the first

signal,

5   means for summing the weighted third signal and a plurality of weighted

reference delays; and

          means for performing a least squares fit between the encoded data and the sum of

the third signal and the plurality of weighted reference delays.

10   16. The communications apparatus according to claim 15, further comprising:

          means for compensating the plurality of weighted reference delays for

degradation by the communications channel of the plurality of delayed versions of the

first signal.

15   17. A communications device comprising:

          a symbol encoder for receiving data comprising a symbol and for receiving a first

signal having a positive entropy, the symbol encoder adding to the first signal a plurality

of delayed versions of the first signal, each delayed version of the plurality of delayed

versions comprising a plurality of available values, the symbol being represented by a set

20   of delay values, a delay value of the set of delay values comprising an available value of

the plurality of available values for the each delayed version of the plurality of delayed

versions; and

          a transmitter for receiving the encoded data from the symbol encoder and for

transmitting the encoded data.

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          18. The communications device according to claim 17, wherein the first signal

having positive entropy comprises one of a chaotic signal, noise signal, and a positive

5   entropy, baseband signal modulated onto a positive entropy signal having a higher

frequency than the baseband signal.

19. The communications device according to claim 18, wherein the chaotic signal

comprises one of a Lorenz system-generated chaotic signal and a Rossler system-

10   generated chaotic signal.

20. A communications device for receiving encoded data, the communications

device comprising:

a receiver for receiving a first signal having positive entropy added to a plurality

15   of delayed versions of the first signal, each delayed version of the plurality of delayed

versions comprising a plurality of available values, wherein encoded data comprises a

symbol, the symbol being represented by a plurality of delay values, a delay value of the

plurality of delay values comprising an available value of the plurality of available values

for the each delayed version of the plurality of delayed versions; and

20   a symbol decoder for receiving the encoded data from said receiver, the symbol

decoder

for summing a second signal, substantially similar to the first signal, and a

plurality of reference delays, and

for maximizing a cross-correlation between the encoded data and the sum

25   of the second signal and the plurality of reference delays.

5   21. The communications device according to claim 20, wherein the first signal

having positive entropy comprises one of a chaotic signal, noise signal, and a positive

entropy, baseband signal modulated onto a positive entropy signal having a higher

frequency than the baseband signal.

10   22. The communications device according to claim 21, wherein the chaotic signal

comprises one of a Lorenz system-generated chaotic signal and a Rossler system-

generated chaotic signal.

23. The communications device according to claim 20, further comprising an

15   equalizer communicating with said receiver and with said symbol decoder.

24. A communications device for receiving encoded data, the communications

device comprising:

a receiver for receiving a first signal having positive entropy added to a plurality

20   of delayed versions of the first signal, each delayed version of the plurality of delayed

versions comprising a plurality of available values, wherein encoded data comprises a

symbol, the symbol being represented by a plurality of delay values, a delay value of the

plurality of delay values comprising an available value of the plurality of available values

for the each delayed version of the plurality of delayed versions; and

25   a symbol decoder for receiving the encoded data from said receiver, the symbol

decoder

5   for summing a third signal, being a weighted version of the first signal,

and a plurality of weighted reference delays, and

    for performing a least squares fit between the encoded data and the sum of

the third signal and the plurality of weighted reference delays.

10   25. The communications device according to claim 23, wherein the first signal

having positive entropy comprises one of a chaotic signal, noise signal, and a positive

entropy, baseband signal modulated onto a positive entropy signal having a higher

frequency than the baseband signal.

15   26. The communications device according to claim 25, wherein the chaotic signal

comprises one of a Lorenz system-generated chaotic signal and a Rossler system-

generated chaotic signal.

    27. The communications device according to claim 24, further comprising an

20   equalizer communicating with said receiver and with said symbol decoder.